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PATENT APPLICATION FOR

METHOD AND APPARATUS FOR HOCKEY STICK HANDLING TRAINING

BY INVENTOR

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Background or the Invention:

01 The invention provides a method and apparatus for training a hockey player to control a hockey puck or ball with a hockey stick. The invention specifically teaches the proper hand, wrist and arm motions for stick handling, builds strength and endurance in stick handling muscles and provides the user with an opportunity to quickly improve stick handling skills.

02 Ice hockey is played on ice with a hockey puck sliding on the ice. Each player uses a hockey stick to control or direct the puck in a desired manner with the objective of shooting the puck into a goal. The act of a single player maintaining control of the puck with a hockey stick is called stick handling. Other types of hockey are also played on non-ice surfaces using balls and pucks, e.g. street hockey, floor hockey and field hockey. In street, floor and field hockey a ball or a puck may be used on non-ice surfaces, but the skills of stick handling are similar in all hockey type games.

03 According to hockey coaches, it is highly desirable for a hockey player to control the puck when playing one on one against a defender and to either, carry the puck past the defender, or to draw the defender toward the puck and then pass the puck off to a teammate. These skills require that the player have the ability to control small position and direction shifts of the puck, using the hockey stick, to pass by and often deceive the defender. It is also desirable that the player be able to control and direct the puck with the hockey stick without looking at the puck or without consciously thinking about the motions. A player that is proficient in stick handling may also have a "high panic point" with the puck, which means that the

player will stay calm while playing against the defended or otherwise controlling the puck under pressure from a defender.

04 Recently stick handling skills among young players has declined. One reason cited is that youth teams have steadily increased the number of games played while proportionately decreasing practice time. In a typical twelve minute per period three period youth ice hockey game, with stop time, a youth player typically only gets onto the ice for about 12 minutes and of that time has the puck on his or her stick for less than 30 seconds. This is not enough time to learn and practice stick handling. Another contributor to the decline in stick handling skills among youth players is a win at all costs mentality that is prevalent among some youth leagues, especially in the premier leagues, and this win mentality has lead coaches and parents to discourage stick handling during youth games to eliminate puck turnover. As a result, youth players are not skilled or confident enough to stick handle at a desired level by the time they reach high school and college hockey programs.

05 To become proficient at any fine motor skill, such as stick handling, requires repeatative training or a high number of repititions of the necessary motions. In general, performing a high number of repetitions serves to train the nerves and muscles to perform the task without conscious effort. It has also been shown that proficiency at a given fine motor skill can be acheived after fewer repetitions of the motion, for a person under the age of thirteen, but that the number of repetions required for a person over the age of thriteen to learn the same fine motor skill is usually dramatically increased. Accordingly, it is very import for youth players of

all sports to develop the fine motor skills required by a sport before the player reaches the age of thirteen. It is a specific problem that many hockey players do not perform enough stick handling motion repetitions to reach the required proficeincy level and this is especially the problem in current youth hockey programs.

06 Stick handling proficiency requires coordinated motions of the hands, wrists and forearms. In particular, the primary motion of stick handling is a rotation of the stick shaft about its longitudinal axis. Ideally, this motion is primarily applied by a torque delivered by the upper hand holding the stick. The upper hand is generally positioned near the end of the stick shaft while the lower hand is usually holding the stick lower toward the ice surface nearer to the center of the longitudinal length of the stick shaft. During stick handling, the proper stick shaft motion is achieved when subtantially all of the rotation of the stick shaft is applied by a rotation of the wrist and forearm of the upper hand, while the lower hand is merely used to guide the stick shaft during rotation. However, the lower hand is also used to lift the stick blade over the top of the puck when the player moves the stick blade across the puck to an opposite side thereof. The upper hand may be the left or the right hand depending on the preference of the particular player.

07 It is important to note that stick handling can be done by other motions of the hands and arms but that these other motions are inefficient and will generally not lead to the player achieving a high proficieny at stick handling skills. For example, a player may achieve similar motions of the puck by applying a lateral motion to the the stick shaft, primarily with the lower hand. Although a player may achieve

some success with this motion, it is not a desirable motion for stick handling and its use will ultimately cause the player to perform below a level that coaches find acceptable. Accordingly, it is a further problem that hockey players do not learn the proper stick handling motions and instead train their muscles to perform incorrect motions. This is further compounded in the fact that once the player has trained the muscles and nerves to perform incorrect stick handling motions, correction of these incorrect motions is difficult.

08 Another aspect of stick handling requires that the muscle strength and endurance of the wrists, hands and forearms be sufficently developed to allow a player to stick handle firmly and quickly. This is a particular problem in youth and womens hockey leauges where muscle strength and endurance may be insuficient for performing the required stick handling movements over a long period, or with suffiucient quickness. In addition, it is advantageous for all players to develop muscle strength and endurance in the hand, wrist and forearm of the upper hand holding the stick shaft because these same muscles are employed for shooting and passing a hockey puck or ball. It is therefore another problem that some hockey players lack sufficient muscle strength and endurance for proper stick handling and it is advantageous for all players to increase hand, wrist and forearm muscle strength for improved shooting and passing.

09 It has long been known to practice stick handling using a ball on non-ice surfaces. Use of a ball or other practice device can provide a player with the high number of repetitions of the stick handling motions that are required for the player to reach proficiency. Since a ball rolling on a non-ice surface simulates puck sliding

motions on ice, the use of a rolling ball is a good training tool for stick handling. A hockey training ball is described in US 6290619 to Mayer II. Mayer II describes a street hockey ball having a center height and weight substantially similar to the center height and weight of an ice hockey puck and suggests that the street hockey ball simulates the feel and action of a hockey puck. Mayer II further states that the street hockey ball specifically provides a very low bounce or a dead bounce and that the street hockey ball described therein provides a viable hockey training device, off the ice. However, Mayer II never teaches or suggests that the proper stick handling motions should be learned and strictly followed during practice sessions.

10 Numerous other on and off ice hockey training devices are know that allow a player to practice stick handling, to keep the head and eyes up during stick handling, and even to practice stick handling around or past a dummy defender (US6165084). These include low friction mats with obstacles attached thereto, (US6364790), a portable stick and practice surface, including electronic puck control feedback, (US5249797), various shields attached to the base of a hockey stick that prevent a player from seeing the puck while stick handling, (US4653753 and 6174248) and tethering devices for attaching a puck or ball to the hockey stick, (US6569041, 5816945, 5120055 and 4491320). In addition, numerous other training devices are known for developing muscle strength and endurance in the muscles used for stick handling and shooting and these devices include various weights attached to the hockey stick, (US5484146, 5520386) and a hockey puck adapted to receive variable weights therein for varying the puck weight (US5284343).

11 Although the prior art recognizes the need for effective off-ice stick handling training, it fails to provide a simple reliable solution that addresses every aspect of stick handling training. In particular, the prior art fails to address the need to teach each player the proper hand wrist and arm motions required for proficient stick handling. In addition, the prior art fails to provide training instructions that can be readily understood and followed by the player and by which the player may monitor progress during training. Moreover, nothing in the prior art provides a system and method that combines development of proper stick handling motions with strength and endurance training as provided by the present invention.

Brief summary of the invention

12 The problems of the prior art described above are addressed by the present invention which, provides a method and a kit for stick handling training for use by a hockey player. The training kit utilizes stick handling a rolling element which may be a solid or hollow ball or cylinder having an element weight to hockey puck weight ratio of 1.3 or greater. The method comprises rolling the element between two positions on a practice surface using a hockey stick. The practice surface may be supplied with the kit or may be a surface having the right characteristics. In particular, the practice surface has a higher resistance to sliding of the rolling element than to rolling of the rolling element. To use the kit, a player uses a conventional hockey stick held in the conventional manner with an upper hand tightly gripping the shaft of the hockey stick at its upper end and a lower hand loosely gripping the shaft at a position usually about 254 - 356 mm, (10 - 14 inches) below the upper hand.

13 The stick handling training is initiated by applying a first torque to the hockey stick shaft using the upper hand. This rotates a blade of the shaft which is in contact with a practice rolling element thereby rolling the rolling element across the practice surface in a first direction. The user then lifts the stick blade over the top of the moving element using the lower hand, to position the stick blade on an opposite side of the rolling element and to stop the rolling element from rolling. The user then applies a second torque, opposite in rotation from the first torque, to the hockey stick shaft using the upper hand to roll the rolling element across the practice surface in a second direction substantially opposite to the first direction. The user repeatedly moves the rolling element between two practice positions about 610 mm, (24 inches) apart to improve stick handling skill and muscle strength and endurance.

14 The kit may also include other rolling elements having element weight to hockey puck weight ratios greater than 1.3 and in a range up to about 10. 7 and specifically the kit may include four solid steel balls having weights ranging from 220 grams (8 ounces) up to 1815 grams (64 ounces) and having diameters ranging from 41 mm, (1.63 inches) to 85 mm, (3 inches). As a minimum, the hockey stick handling training kit includes a rolling element having a weight to hockey puck ratio of greater than 1.3 and a diameter of 38 mm, (1.5 inches) or greater and a practice surface for stick handling the element between two positions on the surface with the surface providing a higher resistance to sliding of the element than to rolling of the element. In one kit the rolling element comprises a solid steel ball and the practice surface comprises a substantially smooth and flat surface formed by a

substantially uniformly thick layer of a molded mat material. The mat may be formed from a molded polyester layer which may include a vinyl face layer applied to the practice surface. Other examples of molded mat materials include, open or closed cell urethane foam, neoprene, ethylene vinyl acetone, silicone and polyethylene.

15 Each practice session may includes performing sets of 30 - 50 stick handling movements of a spherical ball across a 610 mm (24 inch) practice distance. Each practice session may further performing sets of 30 - 50 stick handling motions with each of five spherical balls. In this case the balls are used one at a time and each ball has a different weight and diameter.

Brief description of the drawings:

16 The features of the present invention will best be understood from a detailed description of the invention and a preferred embodiment thereof selected for the purposes of illustration and shown in the accompanying drawings in which:

FIG. 1 illustrates a hockey player holding a hockey stick using the right hand as the upper hand.

FIG. 2 illustrates a hockey player holding a hockey stick using the left hand as the upper hand.

Figure 3 illustrates the regions of a hockey stick.

Figure 4 illustrates one embodiment of a hockey training kit according to the invention.

Figure 5 illustrates the proper motions of a hockey stick during stick handling training according to the invention.

Figure 6 illustrates the proper player and hand positions for stick handling training according to the invention.

Detailed description of the invention:

17 Referring to Figures 1-3, a stick handling start position is shown in front view for a left handed player, in Figure 1, and in front view for a right handed player, in Figure 2. A hockey stick 20 is shown with its various regions labeled in Figure 3. In Figure 1, a left handed hockey player 10 is shown holding a hockey stick 20 in a stick handling position. The hockey stick 20 includes a blade portion 25 for maneuvering a practice ball 60 on a flat practice surface 30, and a shaft portion 35, connected to the blade portion 25, by which the player 10 holds the stick 20 with two hands.

18 The left handed player 10 holds the shaft 35 with the right hand 40 positioned substantially near a top end 45, of the shaft 35. A bottom end 50, of the shaft 35, attaches to the blade portion 25. The left handed player 10 holds the shaft with the left hand 55 position between the top end 40 and the bottom end 50. The left and right hands are usually held between 254 - 356 mm, (10 - 14 inches) apart when gripping the shaft 35. For the left handed player 10, the forehand is the left hand 55. The ball 60 is shown positioned on the practice surface 30 and the blade portion 25 is in contact with both the practice surface 30 and with the ball 60. In both Figures 1 and 2, the ball 60 is shown on the forehand side of the stick blade 25 and in contact with the stick blade 25 at a stick handling region 70 of the blade 25. The blade portion 25 includes a heel 90 and a toe 95, which are shown in Figure 3.

19 Referring to Figure 2, a right handed player 80 is shown in the equivalent stick handling position. In this case the left hand 40 holds the stick shaft at the shaft top end 45 and the right hand 40 holds the stick shaft between the shaft top end 45 and the shaft bottom end 50. Again, the hands are normally separated on the shaft 35 by about 254 - 356 mm, (10 - 14 inches). Although each player 10 and 80 starts with the blade portion 25 on an opposite side of the body, the ball 60 is said to be on the forehand side of the blade 25 for each of the players illustrated in Figures 1 and 2. Accordingly, each of the players 10 and 80 hold the hockey stick with the forehand between the shaft top end 45 and the shaft bottom end 50, with the ball 60 on the forehand side of the blade portion 25. The ball 60 is in contact with the stick handling surface 70 and in contact with the practice surface 30. In general, each player stands with the knees slightly bent and the back bent forward placing the head substantially over the lower hand, (see Figure 6). The eyes look straight ahead and not down at the ball or puck. The arm of the upper hand is bent at the elbow and the upper hand grips the stick shaft top end 45 tightly. The arm of the lower hand hangs nearly straight down from the shoulder placing the lower hand about level with the hip joint and grips the stick loosely to allow rotation of the shaft with respect to the lower hand.

20 As will be further described below, the stick handling practice method of the present invention progressively trains each player to move the hockey stick 20 in accordance with a desirable pattern that is consistent with providing excellent puck or ball control skills when playing ice hockey, street hockey, floor hockey and field hockey. Proper stick handling in ice hockey preferably comprises maintaining the

puck in contact with the stick handling region 70 which extends between the stick heel 90 and about the center of the blade portion 25. In normal practice, proficient stick handlers do not use the blade region 65 near the blade toe 95 for puck control because when the proper stick handling motions are applied to the stick shaft 35, the region 65 is too difficult to control. As shown, the stick blade portion 25 includes a contact edge 85 that remains substantially in contact with the ice or the practice surface 30 when a player is in the stick handling position as described above. The contact edge 85 substantially extends from the heel 90 to the toe 95. The stick handling position described above with the knees slightly bent and the back bent forward to lean the upper body over the hands generally places the contact edge 85 parallel with the practice surface 30. If the contact edge 85 is not parallel with the practice surface 30, the player should adjust the body position or if the body position is correct, select a longer or shorter hockey stick shaft 35 or select a hockey stick 20 having a different lie angle or angle between the stick shaft 35 and blade 25. A typical contact edge 85 has a length of about 230 mm (9 inches).

21 The stick handling area 70 extends from the point 90 to a point 100 having a length of between 100 - 150 mm (4 - 6 inches) from the point 90. The stick handling area 70 is defined on both sides of the stick blade 25 such that the player may use the stick handling area 70 to control the puck using either the forehand or the back hand side of the blade 25. It is noted that when the stick blade 25 is moved laterally to stick handle a ball or puck, the entire blade 25 moves laterally in an equal amount. This is the cheating motion of stick handling. Since by using the

lateral cheating motion the entire blade 25 moves laterally, a player may use part of the blade 25, from the heel 90 to the toe 95, to contact and maneuver a puck or ball. However, when using the proper stick handling motion, which rotates the stick shaft about its longitudinal axis, the blade toe area 65 rotates over a large radius while the stick handling area 70 moves over a smaller radius. As a result, the stick handling area 70 moves less than the toe area 65 and produces a much more subtle motion for steering and maneuvering a ball or puck.

22 According to a preferred embodiment of the invention a practice kit 105, shown in Figure 4, comprises a set of five practice balls (A - E) and a practice mat 110. The set of five balls includes four solid steel balls (A-D) ranging in weight and diameter, with each steel ball (A-D) having a weight that is more than the weight of a standard ice hockey puck. In addition, the kit includes another ball E having a weight that is less than the weight of a standard ice hockey puck. In the preferred embodiment, the ball E is a conventional golf ball. Each of the steel balls (A-D) may comprise a conventional solid steel ball bearing ball having a substantially uniform spherical shape and a substantially homogeneous material distribution to provide consistent and balanced rolling characteristics. The use of steel provides a high weight to volume ratio and a low elasticity for providing a dead bounce characteristic. In addition, steel balls are readily available. However, the balls may be constructed from most metals, e.g. copper, brass, aluminum, titanium, or the like. Moreover, any ball constructed from one or more materials that provide an overall characteristic of a high density and a relatively low elasticity ball can provide the desired results. In short any spherical element constructed from one or

more materials that provide a high density, low bounce characteristic can be used without deviating from the scope of the present invention.

23 In the preferred embodiment of the present invention, ball A comprises a solid steel ball having a diameter of 76.2 mm, (3.0 inches) and a weight of, 1.814 Kg, (64 ounces). As compared with a conventional hockey puck, which weighs 170.1 grams, (6 ounces), the ball A has the same diameter as the puck 76.2 mm, (3.0 inches) and a ball weight to puck weight ratio of approximately 10.6 to 1. In comparing the height of ball A with the height of a conventional hockey puck, the ball A is three times higher off a practice surface than a conventional puck, which has a height of 25.4 mm, (1.0 inch). Regarding the other balls of the kit, the dimensions and weights are listed in TABLE 1 below. TABLE 1 also includes characteristics of other stick handling practice devices which are known in the prior art:

TABLE 1

Practice Element	Weight in grams (ounces)	Dimensions in mm (inches)	Material	Ball to puck weight ratio
BALL A	1814.4 (64)	85.05 (3)	Steel	10.7
BALL B	1077.3 (38)	63.5 (2.5)	Steel	6.3
BALL C	538.65 (19)	50.8 (2.0)	Steel	3.2
BALL D	226.8 (8)	38.1 (1.5)	Steel	1.3
BALL E (Golf Ball)	46.1 (1.6)	41.3 (1.63)	Composite	0.27
Hockey Puck	170.1 (6)	76.2x25.4 (3x1)	Rubber	1.0
Mini Puck	85.1 (3)	63.5x19.1 (2.5x0.75)	Rubber	0.5
Weighted Puck	238.5 (10)	76.2x25.4 (3x1)	Rubber and metal	1.7
Wood Ball	35.43 (1.25)	44.5 (1.75)	Wood	0.21

24 Referring to Figure 4, a mat 110 includes a practice surface 30. The preferred mat 110 has a minimum length 120 of about 650 mm (25.6 inches) but a length 120 in the range of about 750 - 1220 mm (29.5 - 48 inches) allows sufficient space for a player to stick handle a practice ball 60 on the mat surface 30 and to move the ball 60 over a minimum stick handling practice distance which is about 610 mm (24 inches) between the forehand and back hand stick handling positions. The mat width 115 is at least wide enough for receiving the bottom edge or contact surface 85 of a hockey stick blade 25 and preferably about two to three times the width of the contact surface length 85. Accordingly, the mat 110 preferably has a width 115 of approximately 460 - 685 mm, (18.1 -26.5 inches) wide.

25 In a preferred embodiment, two conventional precut interlocking mat sections may be assembled together to form a practice mat 110 of the desired size. Each of the interlocking mat sections has dimensions of 610 mm, (24 inches) square. Accordingly the mat 110 formed from two interlocking sections has a length 120 of 1.2 m, (48 inches), by width 115 of 0.6 m, (24 inches). In general mats and interlocking mat sections suitable for stick handling practice surfaces are readily available in a variety of thicknesses and sizes. Interlocking mats may also include interlocking features on from one to four edges so that larger mats may be constructed. Commercially available mats may also include beveled edges which allow a heavy ball to be more readily rolled onto the mat from a position on a floor that a practice mat is positioned on. It is also noted that the practice mat 110 may be much larger than those described above and that a mat 110 may cover the floor of an entire practice room usable by several players simultaneously. Alternately, the invention may be practiced using no mat at all if a suitable practice surface is readily available. As will be further detailed below, some floors or floor coverings such as rubber or vinyl flooring, carpeting and or artificial grass or other athletic turf surfaces may be suitable as a practice surface.

26 The preferred material for the mat 110 is compliant such that the practice surface is slightly indented by the weight of each of the steel balls, or at least by the weight of the heaviest practice ball A. This slight indentation provides one component of roll resistance to the ball, especially for the heaviest balls A and B. This resistance to rolling prevents the balls from rolling too far when normal stick handling forces are applied. This serves two purposes. One is that a short roll distance of a ball in

response to a normal stick handling force allows better control of the ball during stick handling practice, especially by a novice player. The second benefit of roll resistance is that it forces a player to apply more than the normal stick handling force to move a ball over the normal practice distance and especially the heavier balls A and B. This benefits the player by increasing muscle strength and endurance.

27 A second characteristic of the practice surface is that the surface friction is high enough to prevent sliding motion of the practice balls. For example, if a player tries to cheat by moving the balls over the practice surface with a lateral stick motion applied by the arm of the lower hand, the lateral force applied to a practice ball by the stick tends to cause the ball to slide instead of roll. If the practice surface has low friction, e.g. ice, the ball will slide instead of roll. This is one reason that a player can cheat by using a lateral stick motion for moving a puck on ice. However, on a higher friction practice surface a ball resists sliding and this makes it very difficult for a player to slide the ball using a lateral stick motion. The player will therefore find it easier to use the proper stick motion to roll the ball across the practice surface using a rotation of the stick shaft applied by the upper hand, instead of trying to slide the ball using a lateral force applied to the stick blade by the arm of the lower hand.

28 A friction force F prevents an object from sliding over a surface. The friction force F is defined by F= fN where f is a coefficient of friction between the object and the surface and N is the normal force exerted by the object on the surface. Since f is constant for each steel ball of the kit 105 and since the force N increases with the

weight of each steel ball of the kit 105, the heavier balls A - C are more difficult to slide over the surface 30 because the friction force F is higher and because the inertia required to move a heavier ball is also higher. This is the reason that the balls A - C are well suited for forcing the player to roll the balls using wrist and forearm rotation of the upper hand, holding the stick shaft, rather than sliding the balls using lateral stick motion. As will be recognized, any coefficient of friction f that is greater than 1.0 causes the friction force F to exceed the normal force N. Since the normal force N of each of the balls A - D is already greater than the normal force of a conventional hockey puck, a friction coefficient f between a practice ball (A-E) and the practice surface 30 should be less that 1.0 and preferably between about 0.3 and 0.9.

29 In general, many floor mat types, especially molded mats are readily available and most are suitable for a practice mat according to the invention. In particular, many materials may be used to mold or otherwise form flat area mats including polyester, urethane foam, and polyester with vinyl facing, neoprene, ethylene vinyl acetone, silicone, polyethylene, or combinations thereof. In addition, these materials may be fabricated as open and closed cell structure in varying densities. Such materials are supplied and may be cut to the mat sizes requested by MILCUT INC. of Butler Wisconsin, USA. Such mats are commonly used to protect floors and deaden noise in weight rooms or work out areas.

30 The preferred mat 110 has a smooth flat non-tacky practice surface 30. In addition, the surface 30 is preferably sealed, e.g. by vinyl, or the like, or is substantially non-porous to prevent absorption of liquids which may change the characteristics of the

surface 30, e.g. its friction coefficient. The sealing of the surface 30 may also reduce wear, which may be caused by the continuous motion of the hockey stick blade 35 over the mat surface 30. Such mats may be referred to by mat manufacturers as having a high resistance to chemical damage. The preferred mat material comprises a closed cell urethane layer having a thickness between about 12 - 25 mm, (0.5 - 1.0 inch). The preferred mat material indents slightly under the weight of the balls A-C and has a friction coefficient of about 0.8 between the mat surface and a steel ball. The preferred mat 110 provides sound deadening and reduces wear and damage to the hockey stick and to a floor or other surface that the mat is used on. The preferred mat may also be prevented from movement during a practice session by its design, e.g. by having sufficient weight and friction to remain stationary or by having suction or adhesive elements for attaching to a floor during use. Of course other practice surfaces may be used such as cork, carpet, coated rubber, and the like, however the preferred mat material described above offers good stick handling characteristics.

31 Referring now to Figure 5, the proper motion to be applied to the hockey stick during training sessions as well as a training program for using the kit 105 are described. A player wishing to start a new stick handling training program selects the A ball from the kit 105 and places the A ball on a practice surface 30 which is shown as the surface of a mat 110. The player then attempts to roll the ball A using the blade 25 of the hockey stick 20 to propel the ball A over the normal stick handling practice distance of 610 mm, (24 inches). The motion used to propel the ball A is a rotation of the stick shaft 35 about its longitudinal axis. In Figure 5, the

proper stick handling motion of a hockey stick is shown. In a first position, shown by stick 200, the stick blade portion 205 is tilted to direct its top edge 210 toward a practice ball 215. In addition, the stick is held with the toe portion 220 angled across the center line of the ball 215. A clockwise rotation of the shaft 200, about its longitudinal axis 225, causes the blade portion 205 to rotate clockwise. This turns its upper edge 210 away from the practice ball 215 while bringing the blade lower edge into contact with the ball 215. Continued rotation of the shaft and blade delivers a force to the ball 215 by the lower edge of the blade 205 and the force causes the ball 215 to roll away from the stick blade 205. If sufficient force is applied, the ball 215 will roll the full practice distance of 610 mm, (24 inches) and may well continue to roll further if allowed to continue. However, according to the practice method, the player then lifts the stick blade, using the lower hand holding the shaft, to move the blade 205 over the top of the rolling ball 215 and places the blade 205 in a second position defined by the stick 250 to stop the ball 215 from moving. The practice motion is continued by applying a counterclockwise rotational force to the stick shaft when the stick is in contact with the ball at the position 250. This counterclockwise rotation of the stick shaft 200 delivers a force to the ball 215 that causes the ball to again roll away from the stick blade and back toward the balls' original position.

32 If, using only the forearm and wrist of the upper hand, the player can deliver sufficient rotational force to the stick shaft to roll the larger ball A over the minimum 610 mm (24 inch) distance, then the player may continue the practice session using the largest ball A. However, if the player fails to deliver sufficient

rotational force to the shaft for moving the largest ball A over the minimum distance of 610 mm (24 inch), the player may try the smaller balls B and C and select the ball B or C that is most readily moved over the minimum distance by applying a shaft rotation with the upper hand only.

33 It is also recommended that the player use a conventional wooden hockey stick or a conventional wooden stick shaft having a plastic street hockey blade attached. Composite hockey stick blades are not recommended for use with the kit 105 since they may become damaged by the steel balls. Also, a novice user of the kit 105 should not tape the hockey stick blade with a cloth tape or a friction tape, or the like, friction added by tape increases stick handling difficulty. Once a player has reached a high proficiency level with the kit 105, the hockey stick blade may be taped to increase friction.

34 The stick handling training of the preferred embodiment is performed in training sessions. A complete training session includes three sets. Each set is performed according to the following schedule. The player first performs a warm up using the ball E. The player stick handles the ball E back and forth between two positions, approximately 610 mm (24 inches) apart as shown in figure 5, for thirty repetitions where one movement of the ball over the minimum distance comprises a single repletion such that a normal set includes 15 motions of the ball in each direction. The ball E is specifically used first because the ball E is lighter and more easily maneuvered than a hockey puck. This provides a high contrast with the ball A, which is the next practice ball used in the set sequence. After thirty repetitions with ball E, the player does thirty repetitions with each of the balls A through D

starting with the heaviest ball A and progressing in order toward the lightest ball D. The set is closed with thirty repetitions with the ball E to again provide a high contrast with the steel balls A - D.

35 After completing a first set, the player does two more sets of the same sequence to complete the training session. A complete session may be performed in less than fifteen minutes when a player is first starting out. However, the skilled player can complete a full training session of three sets with each practice ball in less than four minutes. It is suggested that a player performing at least two and preferably three training sessions per day for two to three months can reach a very high stick handling proficiency, while also significantly increasing wrist, hand and arm strength and endurance. According to even the minimum schedule above, a player who performs 30 repetitions per set and two sessions per day for 60 days will receive 14,400 strength training repetitions and 21, 600 stick handling motion repetitions. This is a sufficient number of repetitions for even a novice adult player to train the muscles and nerves to perform the stick handling motion with little conscious effort.

36 Of course other variation of the training session may utilize more or less training time. In general each set should comprise between about 30 - 50 repetitions per ball. Two to three sessions per day produce results very quickly but fewer sessions can be performed with good results. Also, according to the invention, fewer than all of the balls may be used for stick handling and strength training. For example, if a player is proficient at stick handling, a traing session may be selected that utilizes the balls A and B more than e.g. the balls C-E. Such a session would

specifically provide improved strength and endurcance. The balls A and B have a ball to puck weight ration of 10.7 and 6.3 respectively, and this ratio is considerably greater than the device to puck weight ratio of any of the practice devices of the prior art. The high practice element to conventional hockey puck weight ratio provided by the balls A and B allows faster strength and endurance training programs than the training devices of the prior art. Alternately, if as suggested above, a player can not stick handle with the larger balls A or B due to insufficient strength or skill, the player may perform sessions using just the lighter balls (C-E). This will allow the player to start to develop stick handling skills while also building up strength and endurance so that the player may evenetually achieve the strength and skill to begin training on the heaver balls A and B. Also according to the invention, once a player has used the kit to develop the skills required, e.g. after three months, the player may continue to use the kit 105 to keep the skills sharp and to maintain strength by performing practice sets less frequently, e.g. 3 or 4 sessions per week. The kit 105 may also be used in preseason to hone skills in preparation for an upcoming hockey season.

37 Also according to the invention the ball D is specifically designed to increase speed and control during practice sessions. The ball D is just slightly heaver that a conventional hockey puck having a device weight to hockey puck weight ratio of 1.3 and a diameter of 38 mm (1.5 inches). The diameter of the ball D places its contact point with a tilted hockey stick blade, shown in Figure 5, nearly at the same height above the practice surface as the contact point of the stick blade with a conventional hockey puck. Accordingly, the ball D most closely matches the stick

to ball contact feel of stick handling a conventional hockey puck and it has been found that the ball D is specifically suited for increasing stick handling speed and control. Moroever, as a player gets more proficient, using the ball D, the distance between the first and the second ball positions, e.g. as shown in Figure 5, become shorter than the usual 610 mm (24 inches) separations between stick handling positions. This is one indication that the player is moving the stick and the ball faster. It is noted that a very skilled player may be able to quickly stick hanlde the ball D between two positions only about 100 mm (4 inches) apart. This is one indication that the player has reached a very high stick handling skill level since the wrists, hands and forearms are moving the stick more quickly and precisely.

38 Referring to Figure 6, the proper wrist hand and arm motions are defined as follows. The player 600 is shown positioned facing the mat or practice surface 610 holding a hockey stick by the shaft 620. Referring to the lower hand 625 on the shaft 620, the lower hand delivers substantially no torque to the stick shaft during stick handling. The lower hand holds the shaft loosely, either in a closed loop formed by the thumb and index finger or in a slightly opened hand. The palm of lower hand faces upward away from the practice surface 610 under a bottom side of the stick shaft 620. The arm 630 of the lower hand 625 hangs straight down from the shoulder and the lower hand 625 is used to gently lift the stick blade 635 over the top of the practice ball 640 while the arm 630 laterally translates the stick back and forth between the two end positions of ball motion as shown in Figure 5.

39 The upper hand 650 on the shaft 625 delivers substantially all of the torque to the stick shaft 625 by a quick and powerful twist of the wrist and forearm 655. The

wrist and forearm 655 remain substantially fixed in one position during stick handling, e.g. with the elbow 670 bent to position the upper hand 650 on the stick approximately adjacent to the hip joint 675. In a first position the wrist of the upper hand 650 is fully twisting in one direction facing the palm of the upper hand 650 substantially upward or facing away from the practice surface 610. In a second position where the stick shaft 635 is on the opposite side of the ball 640 and the ball 640 is on the opposite side of the player 600, the wrists and forearm 655 are twisted in the opposite direction and the palm of the upper hand 650 faces substantially downward toward the practice surface 610. Accordingly, the wrist and forearm 655 of the upper hand 650 twist the stick shaft alternately in opposite rotational directions to deliver a high amount of torque to the stick shaft 620. In order to deliver the torque, the upper hand 650 grips the stick shaft tightly through the entire motion.

Developing the proper wrist, hand and forearm motions of the upper hand 650 is the most important aspect of stick handling. Using any lateral motion of the lower hand 625 to deliver a moving force to the practice balls, or to a puck on ice, is to be avoided. This motion is referred to as cheating. According the invention, use of the balls A and B substantially prevent the cheating motion that uses the lower hand 625 to move the stick shaft laterally. The balls A and B are too heavy to stick handle with the lower hand 625 and offer too much resistance to a sliding motion which occurs during cheating. The practice surface characteristics as described above substantially prevent any sliding of the balls A and B on the surface 610 such that attempts by a player to use a lateral force applied by the lower hand 625 and

arm 630 will be quickly frustrated. By comparison, a player may be able to cheat using the balls D and E or with practice devices used in the prior art which weigh less and therefore offer less resistance to sliding. Accordingly, use of the balls A and B force players to stick handle using the proper motion and continue to reinforce the use of the proper stick handling motions in each practice session.

41 By combining the features of the apparatus and training methods of the present invention the player receives a unique workout which cannot be obtained with any other system. Strength development along with the proper motions of stick handling are two key elements to better stick handling. The stick handling system of the present invention forces the player to move objects that are more than ten times heavier than a conventional hockey puck to develop strength. This system further forces the player to perform the motions without cheating and to perform thousands of repetitions of the motions in short training sessions. In addition, the apparatus and training methods of the present invention can allow a player to stick handle with little consceous effort and without looking at the hockey stick or puck. This increases the players confidence and overall awarenss of other activity in the game. Accordingly, the player generally begins to perform at a level that coaches demand. An even further benefit of the apparatus and training methods of the present invention is that they also improve a players shooting strength and ability to look in the direction of the shot while shooting.

42 It will also be recognized by those skilled in the art that, while the invention has been described above in terms of preferred embodiments, it is not limited thereto. Various features and aspects of the above described invention may be used

individually or jointly. Furthermore, although the invention has been described in the context of its implementation in a particular environment, and for particular applications, e.g. for ice hockey stick handling training, those skilled in the art will recognize that its usefulness is not limited thereto and that the present invention can be beneficially utilized in any number of environments and implementations including but not limited to street hockey, floor hockey and field hockey training. Accordingly, the claims set forth below should be construed in view of the full breadth and spirit of the invention as disclosed herein.